PTO/SB/21 (12-97)
Approved for use through 9/30/00. OMB 0651-0031
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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TRANSMITTAL FORM

(To be used for all correspondence after initial filing)

Application No.	10/507,437
Filing Date	January 24, 2005
First Named Inventor	Juha Maijala
Group Art Unit	1762
Examiner Name	F. Parker
Total Number of Pages in This Submission	
Attorney Docket Number	METSO-24

- ☐ Fee Transmittal Form
- ☐ Fee Attached
- ☐ Amendment / Response
- ☐ After Final
- ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
- ☐ Response to Missing Parts Under 37 CFR 1.52 or 1.53
- ☐ Assignment Papers *(For an Application)*
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition Routing Slip (PTO/SB/69) And Accompanying Petition
- ☐ To Convert a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Small Entity Statement
- ☐ Request for Refund
- ☐ After Allowance Communication To Group
- ☐ Appeal Communication to Board Of Appeals and Interferences
- ☐ Appeal Communication to Group *(Appeal Notice, Brief, Reply Brief)*
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Additional Enclosure(s) *(Please identify below):*
  - PTO SB/44
  - Request for Certificate of Correction with attached relevant pages of record

Certificate
NOV 16 2007
of Correction

Remarks	The Commissioner is hereby authorized to charge any additional fees that may be required with respect to this communication, or credit any overpayment, to Deposit Account No. 50-2663

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm *or* Individual name	Patrick J.G. Stiennon, Reg. No. 34934
Signature	
Date	November 7, 2007

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this date: November 7, 2007

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Signature		Date	November 7, 2007

NOV 23 2007

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(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO : 7,288,291
DATED : October 30, 2007
INVENTOR(S): Juha Maijala et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the patent's front page under the heading "References Cited", patent no. 3,521,558 should be to --Fisher et al.--

On the patent's front page under the heading "References Cited", patent no. 3,549,403 should be to --Williams et al.--

In column 6, line 29 of the issued patent, "360 g/m2" should be --3–60 g/m2--

In column 13, lines 18 and 19 of the issued patent, "substantially in a plane electrodes" should be --electrodes substantially in a plane--

MAILING ADDRESS OF SENDER:

STIENNON & STIENNON
P.O. Box 1667
Madison, WI 53701-1667

PATENT NO. 7,288,291

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NOV 23 2007

In The United States Patent And Trademark Office

Applicant:	Juha Maijala et al.	Date:	November 7, 2007
Date Filed:	January 24, 2005	Docket No.:	METSO-24
App. No.:	10/507,437	Art Unit:	1762
Patent No.:	7,288,291	Issue Date:	October 30, 2007
For:	A Method for Forming a Film, by Using Electrostatic Forces	Examiner:	F. Parker

Certificate of Mailing

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on November 7, 2007
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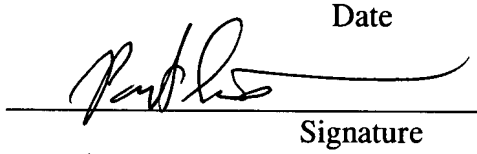

Signature

Patrick J.G. Stiennon, Reg. No. 34934
Name of applicant, assignee or Registered Representative

Request for Certificate of Correction
With Expedited Processing

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant requests that a Certificate of Correction be issued as shown on the PTO/SB/44 enclosed herewith.

This request for correction is incurred solely through the fault of the United States Patent and Trademark Office, as is clearly disclosed in the records of the Office. The accompanying

documentation unequivocally supports this assertion of USPTO error, and includes copies of the relevant pages of the record, so that this request may be processed without the file. The relevant sections of the record have been highlighted in yellow.

Expedited processing is requested under the provisions of the August 21, 2002, Official Notice in 1262 TMOG 96.

Applicant respectfully requests that the typographical errors in the text of the published patent that were not in the original application be corrected by a Certificate of Correction under 37 CFR 1.322.

On the patent's front page under the heading "References Cited", patent no. 3,521,558 should be to --Fisher et al.-- rather than "Patterson et al." as it incorrectly appeared on the Examiner's Notice of Reference Cited dated January 10, 2007.

On the patent's front page under the heading "References Cited", patent no. 3,549,403 should be to --Williams et al.-- rather than "Barbehenn et al." as it incorrectly appeared on the Examiner's Notice of Reference Cited dated January 10, 2007.

In column 6, line 29 of the issued patent, "360 g/m^{2}" should be --3–60 g/m^{2}-- as written in the Substitute Specification dated September 13, 2004 on page 13, line 25.

In column 13, lines 18 and 19 of the issued patent, "substantially in a plane electrodes" should be --electrodes substantially in a plane-- as written in the Examiner's Amendment September 4, 2007, on page 1, lines 11-12.

Applicant believes that these Office mistakes include at least one error of consequence that merits the issuance of a Certificate of Correction as it is of such a nature that the intended

meaning may not be obvious from the context.

Respectfully submitted,

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Correct.res/amdt

Relevant pages from printed U.S. Patent No. 7,288,291

US007288291B2

(12) **United States Patent**
Maijala et al.

(10) **Patent No.: US 7,288,291 B2**
(45) **Date of Patent: Oct. 30, 2007**

(54) **METHOD FOR FORMING A FILM, BY USING ELECTROSTATIC FORCES**

(75) Inventors: **Juha Maijala**, Tampere (FI); **Johan Grön**, Espoo (FI); **Kaisa Putkisto**, Tampere (FI); **Vilho Nissinen**, Numminen (FI); **Pentti Rautiainen**, Järvenpää (FI)

(73) Assignee: **Metso Paper, Inc.**, Helsinki (FI)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 183 days.

(21) Appl. No.: **10/507,437**

(22) PCT Filed: **Mar. 11, 2003**

(86) PCT No.: **PCT/FI03/00182**

§ 371 (c)(1),
(2), (4) Date: **Jan. 24, 2005**

(87) PCT Pub. No.: **WO03/076083**

PCT Pub. Date: **Sep. 18, 2003**

(65) **Prior Publication Data**

US 2005/0123777 A1 Jun. 9, 2005

(30) **Foreign Application Priority Data**

Mar. 14, 2002 (FI) 20020479
May 28, 2002 (FI) 20020998

(51) **Int. Cl.**
B05D 1/06 (2006.01)

(52) **U.S. Cl.** **427/482**; 427/475; 427/477

(58) **Field of Classification Search** 427/475, 427/477, 482

See application file for complete search history.

(56) **References Cited**

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3,521,558	A *	7/1970	Patterson et al.	101/114
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(Continued)

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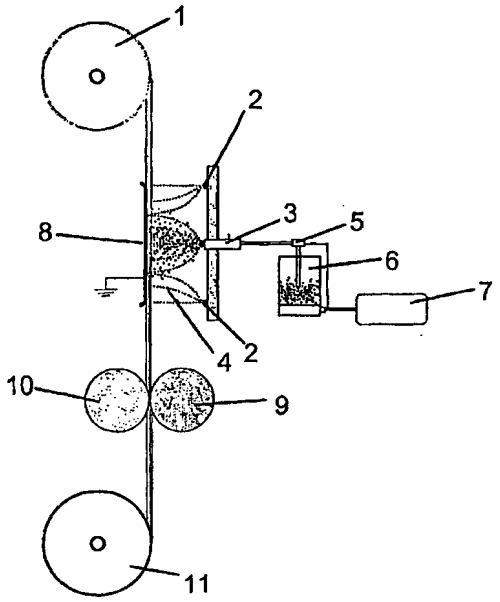
(Continued)

Primary Examiner—Fred J. Parker
(74) *Attorney, Agent, or Firm*—Stiennon & Stiennon

(57) **ABSTRACT**

A film is formed on a planar surface by applying a granular layer on the planar surface by using electrostatic forces, and then finishing the granular layer to form the film. A converting line may be rebuilt to have devices employing this method. A multilayer sheet-like product comprising a film layer may be produced.

15 Claims, 1 Drawing Sheet



and grinding, as shown in table 1. Therefore, there are several methods available to produce, refine and combine the coating components.

Polymer materials applicable in powder form include thermoplastics such as polyamides (PA: Nylon-11 and Nylon-12, preferably high crystalline grades), polyolefins like polyethylene (PE-LD, PE-LLD, PE-HD, PE-MD), polypropylene (PP), and their copolymers, polyesters like poly(ethylene terephthalate) (PET) and poly(butylene terephthalate) (PBT), and others like poly(vinylidene chloride) PVDC, poly(tetrafluoroethylene) (PTFE), polyacetal (POM), ethylene-vinyl alcohol (EVOH), polyvinyl alcohol (PVOH), ethylene-vinyl acetate (EVA), polyvinyl butyral (PVB), acid copolymers, starch, ionomers, a selection of biodegradable polymers, and amorphous polymers like polystyrene (PS), acrylonitrile-butadiene-styrene (ABS), polyvinyl acetate (PVAc), polycarbonate (PC), poly(methyl methacrylate) (PMMA) and polyvinyl chloride (PVC) can be used. Available thermosetting polymers are e.g. epoxies and its blends, Formaldehydes and some polyesters. Grinding of sticky (low Tg) plastics may require cryogenic conditions.

The inorganic pigments include e.g. ground calcium carbonate, precipitated calcium carbonate, kaolin, calcined clay, talc, titanium dioxide, gypsum, alumina trihydrate and silica pigments. The amount of inorganic material in the powdery film forming material is 40 wt-% at the most, preferably 20 wt-% at the most and more preferably 12 wt-% at the most. It is possible that there is no inorganic material, and in some films manufactured according to the method of the invention it is advantageous if the granular layer is free from inorganic material. The mentioned possibilities of producing the powdery film forming material are summarized in table 1.

TABLE 1

Description of the possibilities for manufacturing and blending of the components of the powdery film forming material.

Polymerization process	Dispersion medium	Physical state
High-pressure polymerization	Gas	Mechanical mixture of separate inorganic pigment and polymer particles Blend particles of inorganic pigment and polymer(s) ground to powder
Polymerization in supercritical conditions	Gas	Separate inorganic pigment and polymer(s) Hybrid of inorganic pigment with polymer(s)
Suspension Polymerization	Liquid	Separate inorganic pigment and polymer(s) particles Hybrid particles of inorganic pigment and polymer(s)

The formation of a uniform film layer requires powder melting, spreading and adhesion on the substrate surface. These are affected by e.g. thermal and pressure conditions, initial particle size, Theological properties of the melt, substrate roughness and chemical compositions (i.e. surface energies, bonding sites, multicomponent materials). When the materials require some kind of refining, the preparation process parameters require optimization to create a fine-sized and homogeneous powdery film forming material without forming strong aggregates in the dried or ground powder. These aggregates could, due to their large size, give an uneven and too porous film layer interfering the permeation properties. Polymer thermal deformability during thermomechanical treatment determines the layer properties such as density, openness, smoothness, strength and optical properties.

The particle properties directly influence the conditions during the initial powder application, which includes the fluidized bed during powder transport and electrostatic deposition as an initial adhesion. By grinding mm-scale polymer granulate particles, particles in the range 50-250 μm have been produced. Also the drying conditions of the material blends in suspensions have been found to greatly influence the particle size distribution of the coating powder. Aggregates in the range of 5-500 μm after spray drying and 1-100 μm after freeze-drying have been produced. The average aggregate or particle size can be further reduced when applying a certain post-grinding. Favorable particle size does not exceed 100 μm, but particles as small as a few nm can be used. It can be said that a particle size close to 10 μm would be preferable in respect to the charging properties but it depends on the powdery film forming material. The components of the powdery film forming material can have varying electrical properties such as particle surface charging and discharging rate.

A considerable reduction of the applied polymer amounts has been possible due to further optimized thermomechanical fixing conditions (e.g. dwell-time, surface temperature and linear load). Barrier coatings and adhesive layers produced by the dry surface treatment process can have an advantage from the lowest possible film weights. The applicable film weight in one application is 360 g/m^2, which corresponds to approx. 3-100 μm layer thickness with plastics. Powder fineness allows the application of thin film layers, and the formed layer homogenize with a feasibly low energy input in the thermomechanical treatment compared to that in the extruder mixing section.

It is advantageous if all the steps of the manufacturing process are made in dry conditions. For example, the powder components should be produced as dry or the preparation needs to be done in another carrier medium than water (e.g. air, another gas or an evaporable liquid). This is to be done to avoid the related costs and possible powder defects such as too strong agglomeration and large particle size.

The most profitable way could be preparation of dry powder components without the need for drying where the particle morphology is adjusted in the production process. Fine-sized polymer particles can also be formed by synthesis in a gas phase, for example in supercritical carbon dioxide (sc-CO_2). The separation of the solvent from product is simplified because CO_2 reverts to the gaseous state upon depressurization, thus eliminating energy intensive drying steps. The selection of suitable monomers is quite large, including combinations of styrene, butadiene, vinyls, acrylates, and olefinic monomers (typically emulsion, suspension, or bulk polymerized grades). The end product is a dry powder with a particle size between 0.2 and 10 μm readily recovered by venting CO_2.

In dry surface treatment process of miscellaneous converting substrates, the powdery film forming material for forming the granular layer is sprayed through an area of strong electric field and high free-ion concentration to the surface of the substrate. The powdery film forming material is put into the feeder chamber and transferred to the powder deposition unit with compressed air. The compressed air is used for many purposes such as powder fluidizing, transporting, and conditioning. As the complexity of the application equipment, the charging unit and the powdery film forming material properties vary, the importance of a continuous supply of clean and dry air also increases. The air

13. A peelable packaging material for example for lids of yogurt cans is composed of the following layers:

a polyester layer *

a printing layer

an adhesive layer *

a polyester layer *

a layer of peelable material *

The invention claimed is:

1. A method for forming a film on a continuous or endless planar surface, comprising the steps of:

moving the continuous or endless planar surface between a row of electrodes and a backing electrode which are located at opposite sides of the continuous or endless planar surface and are at different potentials;

supplying pre-charged powdery particles to a feeding nozzle, the feeding nozzle forming an electrode in a position laterally spaced from and between extra electrodes to form the row of substantially in a plane electrodes and blowing the pre-charged particles from the feeding nozzle toward the continuous or endless planar surface and depositing onto the continuous or endless planar surface a layer of the pre-charged powdery particles of average size less than 100 μm containing less than 40wt-% inorganic additives to form a granular layer, wherein the particles are applied to the continuous or endless planar surface by the powder deposition unit utilizing an electric field created by the row of electrodes formed by the feeding nozzle and the extra electrodes; and

finishing the granular layer in a calender with at least one heated member contacting the granular layer, to form a first film.

2. The method for forming a film of claim 1, wherein the at least one heated member contacting the granular layer is a roll.

3. The method for forming a film of claim 1, further comprising the step of: peeling the film off from the continuous or endless planar surface.

4. The method for forming a film of claim 1, wherein the continuous or endless planar surface is a paper web.

5. The method for forming a film of claim 1 wherein the continuous or endless planar surface is a paper web; and further comprising the steps of:

moving the continuous paper web at 150 to 1,200 meters per minute between the electrodes which are located at opposite sides of the web and are at different potentials and past the electrostatic powder deposition unit;

depositing onto the web the layer of electrically charged thermoplastic powdery particles of average size less than 100 μm containing less than 40 wt-% inorganic additives to form the granular layer wherein the granular layer has a weight of 3-60 g/m^2, wherein the particles are charged and applied to the continuous paper web by the powder deposition unit utilizing an electric field created by the electrodes; and

finishing the web with the granular layer in the calender with at least one heated member contacting the granular layer, to form a first film which is 3-100 μm thick.

6. The method for forming a film of claim 5, wherein the at least one heated member contacting the granular layer is a roll.

7. The method of claim 5, wherein the electrodes at the opposite sides of the web comprise either:

a pair of a positive electrode and a negative electrode; or

a negative or a positive electrode and an earthing electrode.

8. The method of claim 5, wherein a second film is formed on a side of the paper web opposite the first film by a process which is the same as used to form the first film.

9. The method of claim 7, wherein the second film is formed on the side of the paper web opposite the first film at the same time as the first film is formed.

10. The method of claim 5, wherein the powdery particles are carried to the web in a gaseous flow.

11. The method of claim 5, wherein the powdery particles are charged by corona charging electrodes.

12. The method of claim 5, wherein the powdery particles are charged by a system using triboelectric charging.

13. The method of claim 5, wherein the powdery particles are charged by using both corona charging electrodes and a system using triboelectric charging.

14. A method for forming a film on a continuous paper web or board, comprising the steps of:

pre-charging particles of a dry powder within a charging unit;

supplying the pre-charged particles from the charging unit to negatively charge a feeding nozzle which forms an electrode and blowing the pre-charged particles from the feeding nozzle toward the paper or board web, the feeding nozzle being positioned between negatively charged electrodes producing corona discharges, wherein the negatively charged electrodes are positioned outside of the charging unit and laterally spaced from the feeding nozzle, so that the negatively charged electrodes and the feeding nozzle form a row substantially in a plane, wherein the negatively charged electrodes arranged to attain an even electric field with the electrode formed by the feeding nozzle; and

wherein the paper or board web is backed by a grounding electrode at a potential which is lower than or opposite to the potentials of the feeding nozzle, and the negatively charged electrodes producing corona discharges.

15. The method of claim 14 wherein the grounding electrode is a stationary platy electrode.

* * * * *

Relevant page from the Substitute Specification dated September 13, 2004

preparation process parameters require optimization to create a fine-sized and homogeneous powdery film forming material without forming strong aggregates in the dried or ground powder. These aggregates could, due to their large size, give an uneven and too porous film layer interfering the permeation properties. Polymer thermal deformability during thermomechanical treatment determines the layer properties such as density, openness, smoothness, strength and optical properties.

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Relevant page from Examiner's Amendment in U.S. Application No. 10/507,437,
Dated September 4, 2007

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Patrick Stiennon on 8-16-07.

The application has been amended as follows:

- Non-elected claims 34-35 have been canceled.
- Claim 21: lines 6 & 11: the word - - powdery - - has been inserted before "particles"; line 7, "is" has been deleted; line 8, the phrase - - substantially in a plane - - has been inserted after the second occurrence of "electrodes".
- Claim 25, line 6, the word - - powdery - - has been inserted before "thermoplastic".
- Claims 30-33, line 1 of each, : the word - - powdery - - has been inserted before "particles".
- Claim 36, line 11, the phrase - - substantially in a plane - - has been inserted after "row".
- Claim 37, line 1, dependency "5" has been deleted and replaced by - - 36 - -.

Examiner's Notice of References Cited dated January 10, 2007

Notice of References Cited	Application/Control No. 10/507,437	Applicant(s)/Patent Under Reexamination MAIJALA ET AL.	
	Examiner Frederick J. Parker	Art Unit 1762	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-3,549,403	12-1970	BARBEHENN HERBERT S; et. al.	427/471
*	B	US-3,521,558	07-1970	PATTERSON CHARLES B; et. al.	101/114
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Powder Coatings The Complete Finishers Handbook, ed. by N.P. Liberto, 1994, pages 86-89.
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Front page from the two patents cited on the
Examiner's Notice of References Cited

July 21, 1970 W. T. FISHER ET AL 3,521,558

ELECTROSTATIC PRINTING WITH POTENTIAL CONTROL

Filed Aug. 26, 1968 4 Sheets-Sheet 1

FIG. 1.

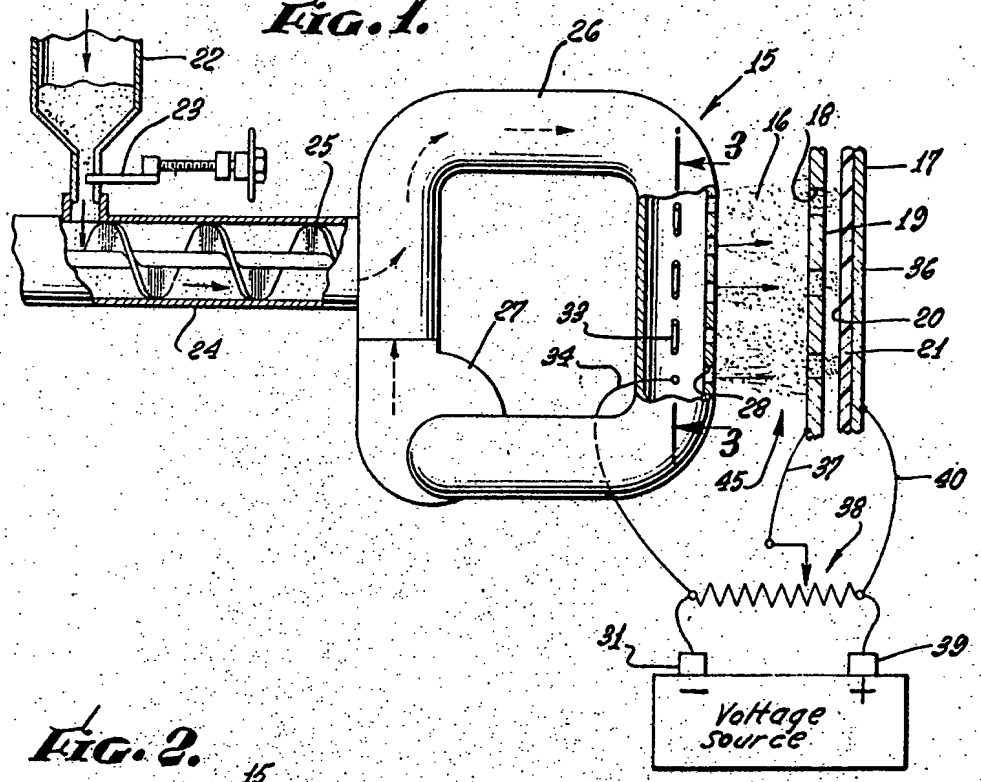


FIG. 2.

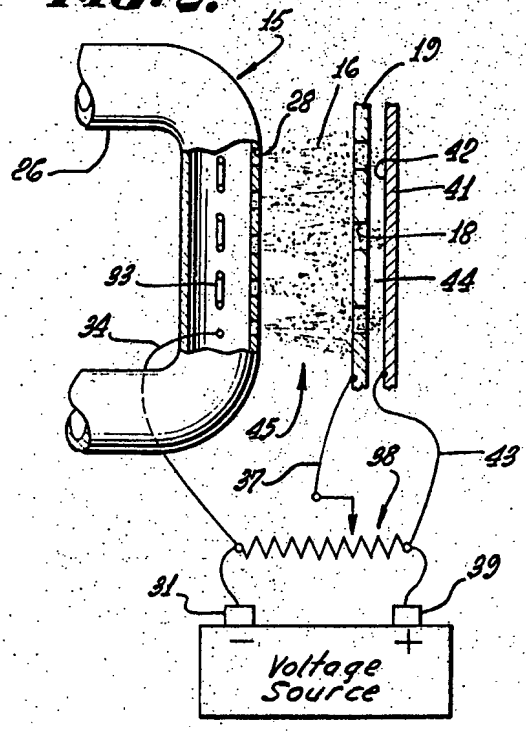
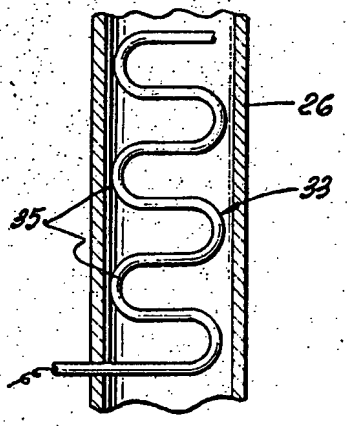


FIG. 3.



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METHOD OF COATING PAPER WITH THERMOPLASTIC RESINS

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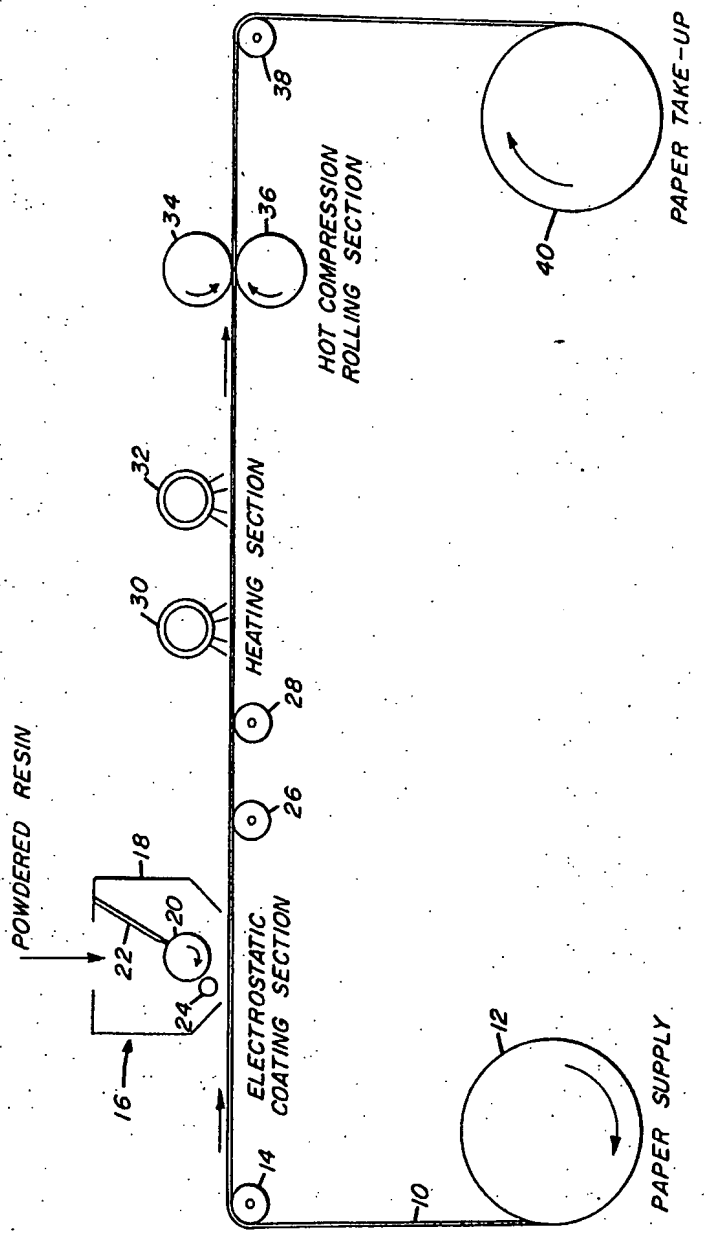

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